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How do socio-ecological factors shape culture? Understanding the process of micro-macro interactions

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## Abstract

Socio-ecological environments produce certain psychological functions that are adaptive for survival in each environment. Past evidence suggests that interdependence-related psychological features are prevalent in East Asian cultures partly due to the history of “rice-crop farming” (vs. herding) in those areas. However, it is unclear how and why certain functional behaviors required by the socio-ecological environment are sublimated to become cultural values, which are then transmitted and shared among people. In this paper, we conceptually review the works examining various macro sharing processes for cultural values, and focus on the use of multilevel analysis in elucidating the effect of both macro and individual level factors. Uchida et al.’s study (2019) suggests that collective activities at the macro level (community-level), which is required by a certain socio-ecological environment, promote interdependence not only among farmers but also non-farmers. The multilevel processes of how psychological characteristics are construed by macro factors will be discussed.

Keywords; socio-ecological environment, culture, collective activity hypothesis, multilevel analysis

## 1. Introduction

A multitude of cross-cultural studies in psychology have shown that psychological functions vary largely across different cultural contexts. For example, interdependence (e.g., seeking harmony) and holistic thinking styles are more prevalent in East Asian cultural contexts, while independence (e.g., seeking uniqueness) and analytic thinking styles are prevalent in North American/European cultural contexts [1, 2]. Expounding on past research, current studies in cultural psychology seek to elucidate factors that underlie such cultural differences [e.g., Ref. 3].

### *1.1 Culture and the Socio-ecological approach*

One's socioeconomic/ecological environment is a key factor in shaping psychological and behavioral functions for the purpose of survival and adaptation in that given environment. For example, farming labor affords collective decision making and holistic thinking styles, while herding labor affords independent decision-making processes and analytic thinking styles (see Refs. [4, 5, 6, 7, 8]). Furthermore, recent evidence suggests that there are sizable differences depending on the type of farming. Specifically, rice-based agriculture promotes interdependence because it requires greater cooperation within the community compared to wheat-based agriculture [9, 10, 11]. Thus, the socio-ecological environment allows us to differentiate psychological and

behavioral functions of societies in a more fine-grained manner beyond the traditional dichotomy of “East vs. West” (see Ref. [12]).

### *1.2 Culture, as a macro process, beyond individuals*

However, the current status of socio-ecological research does not adequately explain how psychological and behavioral functions are shared among members of a community. Some ecologically adaptive psychological/behavioral functions are acquired individually (such as through individual learning based on personal experiences) rather than socially [13]. However, recent studies suggest that people, including peripheral members of a community, share the same psychological/behavioral functions of members who directly engage in ecology-related occupations or activities, outside of their own personal experiences. For example, Uskul et al. [6, 7, 14] showed that holistic thinking styles were higher even for family members living in farming communities (e.g., wives and children of farmers), who did not actively engage in farming. Similarly, Uchida et al. [15] demonstrated that non-farmers living in farming communities were more likely to be interdependent than those living in other areas. In addition, research from China showed that students who came from farming communities displayed holistic thinking styles, despite not engaging in farming activities themselves [9]. Thus, psychological

tendencies can be shared among members of a cultural group, even if there exist individual differences in their connections to specific socio-ecological conditions. In other words, socio-ecological factors affect psychological tendencies not only at the individual level, but also at the macro level.

### *1.3 Multilevel approach*

To empirically investigate how psychological/behavioral functions are shared among community members, the consideration of both individual and macro-level phenomenon is needed [16]. As people living in the same areas share common socio-ecological environments (e.g., climate), single level analyses (analyzing either individual-level factors or macro-level factors) might condense both compositional and contextual effects of a phenomenon, discounting important information that could have been gleaned by a multilevel analysis. Particularly, the compositional effect explains how personal characteristics affect behaviors or psychological tendencies at the individual-level, while the contextual effect explains how socio-ecological environments (macro-level factors) affect individual behaviors or psychological tendencies at the macro level [17]. Unlike single-level analyses, multilevel analyses of data with nested structure allows the differentiation of effects into both the individual and macro levels [18]. In past cultural

psychology literature, Uchida et al. [15] collected data from more than 7,000 individuals from approximately 400 communities, and statistically separated the macro-level (community-level) and the individual-level effects. Similarly, Fukushima et al. [19] demonstrated that trust toward community members has a positive individual-level effect and a negative community-level effect on subjective well-being. Takemura et al. [20] also demonstrated that economic wealth is more positively associated with independence at the macro level than the individual level. The existence of these *contextual effects* (e.g., individuals living in wealthy areas are likely to be independent even when they themselves are not wealthy) suggests that socio-ecological conditions may affect psychological functions at the macro level through social sharing among individuals. It is noteworthy that macro-level factors that originated from a given socio-ecological environment can become its own “culture” that is shared among members through a shared meaning system. Consequently, cultural processes (e.g., social learning, social norms, and shared meaning systems) play unique roles beyond individual factors, which cannot be solely explained by individual-level characteristics.

This begets the questions: (1) how are psychological functions shared among the members of a community and (2) what is the macro learning process? In the next sections,

we review how “macro culture” is shared among community members, through norm creation and transmission, collective activities, and collective memories.

## *2. How is “macro culture” shared?*

### *2.1 Norm creation and transmission as with culture of honor*

Cultural norm creation through social interactions is one form of the macro learning process. Nisbett and Cohen’s famous work [5] suggested that “culture of honor” related psychological tendencies (e.g., justified anger after receiving insults) are associated with a local history of herding in the Southern regions of the US.

Historically, herders had to protect their economic assets (e.g., cows) from potential thieves by themselves. In order to avoid such risk, herders had to build a reputation as a tough man by reacting aggressively to threats such as insults, thereby defending their honor from each other. Thus, through repeated social interactions, they have collectively created a shared norm that values honor in a man. While the risk of stealing is mitigated in the modern herding context, the code of honor among the people in Southern regions of the US still remains as a self-sustaining system that regulates community members’ behaviors. This culture of honor is likely manifested in social interactions among

members of these communities through small talk (e.g., “Hey, do you know? Bob got furious after getting insulted from Sam, and he hit Sam strongly!”) that carry evaluations (e.g., “Oh, Bob is a man”), or public cultural products [21, 22, 23] such as movies (e.g., showing physically strong man as a hero). These interactions occur between herders and non-herders in a herding community, through joint activities such as Sunday church services (“collective activity” explained in the next section).

Norm creation exists hand in hand with norm transmission, where education plays an important role in the continual adoption of the created norm among newer members of the community. Nisbett and Cohen [5] suggested that boys in Southern part of the US were taught by family members to protest against insult, and were allowed to use force to protect themselves. Also, children in herding communities were more likely to feel the pain of others being ostracized than children in farming communities [14]. Children learn cultural values required in their cultural context through educational textbooks [24], picture books [25] and through social interactions with their parents [26] or with peers [27]. Adults acquire cultural values through social interaction with the members of their cultural communities, such as regional areas that share socio-economic environments, as well as group organizations (e.g., companies) that share



collective goals. They can learn cultural values from their peers' behavior [e.g., Ref. 28], which is further reinforced through communication [29, 30].

## *2.2 Macro-process of accruing socio-ecologically afforded values: collective activity hypothesis*

Cultural values are also shared through collective activities. As we described in the previous section, people share norms and use reputation systems in social interactions, and these interactions are likely to happen via participation in collective activities. Our previous work [15] drew from the processes within ecologically connected local communities and discussed how people acquire certain types of behavioral/psychological functions and shared cultural values through engaging in collective activities.

Uchida et al.'s paper [15] questioned why non-farmers in farming areas became more interdependent without personally engaging in farming activities as shown by Talhelm et al. [9]. According to the "collective activity hypothesis," we predicted that the frequency and prevalence of collective activities, including both socio-economic (e.g., maintaining irrigation systems) and other non-directly related activities (e.g., town meetings and festivals), foster interdependence throughout the community. This is

especially true in farming communities (rice-cropping in Japan), where participation rates in such activities are higher than fishing or other communities. Through participating in such collective activities, people are able to create shared norms or rules to regulate their behaviors as mentioned above in the cultural norm creation and transmission process [31]. These activities are attended by both farmers and non-farmers, as traditional rice-cropping in Japan is labor intensive [9, 32, 33].

For communities to have such collective activities, coordination and mutual trust are required among its participants. In the process, people depend on implicit trust inferred through the reputation of each person's contribution to the community [34, 35]. It becomes risky if they receive negative evaluations from others in their ingroup, since a bad reputation might lead to social exclusion [36, 37]. The avoidance of such a risk highlights their social concerns, which is one aspect of interdependence [38, 39].

In accordance with this prediction, Uchida et al. [15] analyzed the data (N=7,295) collected in 412 Japanese communities (approximately 100 households from each community) and conducted a multilevel analysis to examine both macro-level effects (living in a farming area) and individual-level effects (engaging in farming/agricultural activities). Their findings revealed that the ratio of farmers in the community (macro-level factor) promoted interdependence above and beyond engagement in farming

(individual-level factor), and this contextual effect was mediated by participation in collective activities (including non-farmers) at the macro-level. This suggests that a shared macro-level culture exists among farming areas, which includes farmers and non-farmers.

### *2.3 Cultural transmission through collective memory*

Lastly, the collective memory of a culture is an important part of the macro sharing process. Collective memories transmit and share collective norms or customs among communities, including one's family and organization. It consists of “publicly available symbols maintained by society” and/or “individual memories shared by members of a community that bear on the collective identity of that community” [p 439, [40] see Refs. [41, 42, 43].

For the former, cultural memory is shaped by cultural products, such as narrative stories or music shared during collective activities, passed down throughout history via intergenerational transmission. Festivals and rituals serve as reminders of the community's history and identity. It maintains their identity and guides the actions of members belonging to a certain group (nation, community, or family), through

accessing their shared narratives, which reinforces group membership and strengthens future decision making that perpetuates the collective memory.

The latter aspect suggests that collective memory is constructed through the reciprocal and dynamic interactions between individuals in a community and their attitudes and behaviors toward each other. Conversations among these members reinforce their collective memories, which contribute to the construction of shared realities [44, 45, 46].

### *3. Conclusion*

Culture is a macro phenomenon that is maintained through the psychological output and behaviors of individuals under specific social settings. Individuals construct macro-level norms or notions by inferring from each other's output. Hence, unpacking the processes behind this mutual construction of culture is important. We highlight the necessity for culturally/socially oriented psychologists to elucidate how socio-ecologically driven psychological functions become "cultural values", and how they are subsequently transmitted and shared among people. We promote the use of multilevel analysis as a fitting tool to examine this issue and demonstrate recent works that suggest

several processes to foster culturally shared macro-level phenomena, such as participation in collective activities or sharing collective memory through interpersonal communication.

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\*of special interest

\*\*of outstanding interest total 10%

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